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Shaping local response – The influence of transnational municipal climate networks on urban climate governance

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ABSTRACT

In recent years, many cities have joined transnational municipal climate networks (TMCNs), which were set up in response to climate change. Despite the fact that some of these TMCNs have been active for more than two decades, there has been no systematic investigation of the networks' impact on local climate governance. In this article we attempt to answer if and how local climate governance has been influenced by municipalities' memberships in TMCNs. Our assessment is based on an online survey conducted with staff from all German cities above 50,000 inhabitants with membership in TMCNs, fieldwork and interviews in seven German cities. Network membership mainly influences local climate governance through the following processes: (1) *Enabling internal mobilisation* (2) *Formulating emission reduction goals* (3) *Institutionalising Climate Trajectories* (4) *Enabling direct exchange* and (5) *Offering project support*. Our data suggests that the main influences of TMCN membership unfold in internal political processes in the member cities. External interactions, such as between cities or between network staff and cities is comparably less important. We also found that many of these benefits can be associated with laggards rather than pioneering cities. We conclude that TMCNs have considerable influence on local climate governance in Germany.

1. Introduction

World-wide, the implementation of climate change policies for mitigation and adaptation is increasingly becoming a task for local governance. Cities offer great potential for climate change mitigation measures since they represent concentrations of flows of physical materials (Anderberg, 2012) and carbon (Bulkeley et al., 2013). In the face of increasing numbers of climate change induced threats (IPCC, 2014), questions of adaptation have also entered the urban climate agenda (Wamsler, 2014). Consequently, there has been increasing demand for more or improved climate governance, which has been addressed through a range of approaches and initiatives: e.g. national programmes, regional cooperation, public-private partnerships and engaging communities (Bulkeley and Newell, 2015).

In this context, several transnational municipal climate networks (TMCNs) have been established in recent decades. These are networks of local governments that voluntarily come together to improve climate governance (Kern and Bulkeley, 2009). Some focus on either mitigation or adaptation; others combine these two interrelated topics (Busch, 2015). TMCNs have gained growing attention in the 2000s with an increasing number of publications focussing on their functions within and impact on multilevel climate

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governance (Bulkeley et al., 2003; e.g. Bulkeley and Kern, 2006; Davies, 2005; Toly, 2008). However, investigations assessing how TMCN memberships influence local climate policies and governance are scarce (e.g. Davies, 2005; Hakelberg, 2014; Zeppel, 2012).

The aim of this article is to address this gap by identifying and assessing the major impacts of TMCN membership on local climate governance in a coherent and systematic manner. With this article we aim to increase the scientific understanding of the impacts of TCMNs as well as providing ideas to practitioners as how they can improve their work. Our research focus is on the local level of urban climate governance.

Our inquiry builds on empirical data from Germany. Germany is the country within the European Union (EU) with the largest population and the largest economy, and a country where membership in TMCNs is very widespread (Busch, 2015). 136 out of 183 German cities with more than 50,000 inhabitants are members of at least one TMCN. Simultaneously, Germany has considerably reduced its greenhouse gas (GHG) emissions and has initiated an ambitious transition of its energy system: the *Energiewende* (Gawel et al., 2014; Strunz, 2014). Many cities have played an active part in this process through local measures such as local building codes (Kronsell, 2013) or supporting renewable energy projects through local power suppliers (Busch and McCormick, 2014). Due to these characteristics, Germany can serve as a critical case from which we can learn about the role of TMCNs in local climate governance.

We attempt to answer the following overarching research question:

Which impacts do TMCNs have on municipal urban climate governance?

We operationalise this question by posing and answering the following sub-research questions:

Which aspects of local climate governance are influenced by membership in TMCNs?

How do these impacts occur?

What does this mean for climate pioneer and laggard cities?

"Impact" is here defined as *a modification of urban climate governance which can be traced back to any aspect of TMCN membership*.

This introduction is followed by a brief overview of the most important TMCNs, and a summary of the scientific literature on these networks, including their historical development. Thereafter, we present previous theoretical frameworks and studies on local impacts of TMCNs. In the methodology section we present our approach, methods and data. In the following sections, we present and discuss our results, before we conclude by summarising our findings, placing them in the wider context of research on TMCNs and suggesting further trajectories of research on this topic.

2. Theory: TMCNs, their history and conceptual underpinnings

Several definitions of TMCNs have been brought forward in recent years. For this article we draw on a definition by Busch (Busch, 2016): TMCNs are transnational institutions which provide space for local governments to have an exchange on topics related to the governance of climate change. This In turn means that TMCNs a) have to have members from different countries: b) members can acquire formal membership; c) a network is more than a city partnership, hence TMCNs have more than two members; d) a TMCN focusses on climate issues; e) the network has its own staff and physical address (Busch, 2015). All TMCNs included in this article operate in Germany (see Table 1).

The two most important networks in Germany, Climate Alliance and the Covenant of Mayors are intertwined in several ways. Climate Alliance is part of the consortium running the Covenant of Mayors on behalf of the European Commission. The networks hold conferences jointly, e.g. the European conference of Climate Alliance 2013 in The Hague was at the same time used as assembly for members of the Covenant of Mayors. Several staff members are employed by both networks simultaneously. In addition, Climate Alliance and the Covenant of Mayors share the same address for their Brussels offices (Busch, 2015). Despite the links between different networks, different TMCNs have different goals and objectives: for example C40 Cities Climate Leadership Group (in the following C40) aims at bringing together megacities and cities which are with a very strong track record in regards to climate

Table 1
TMCNs active in Germany.

Network	Focus	Members	Members in Germany	German members above 50,000 inhabitants
Mayors Adapt (since 2015 part of Covenant of Mayors)	Adaptation	137	11	10
Covenant of Mayors	Mitigation	7335	62	40
Climate Alliance (only full individual members)	Mitigation and adaptation	1715	480	127
C40	Mitigation and adaptation	90	2	2
Energy Cities (only full individual members)	Mitigation	2698	8	6
Future Cities	Adaptation	8	2	1
Cities for Climate Protection Europe (ICLEI Programme)	Mitigation and adaptation	176	11	9
World Mayors Council on Climate Change	Mitigation and adaptation	131	1	1
UNISDR Resilient Cities	Adaptation	3553	1	1

Source: adjusted from Busch (2015). Numbers updated April 2017.

governance and Climate Alliance seeks to act in solidarity with the indigenous people of the Amazon (Busch, 2016). These different profiles and goals leads to a situation in which certain networks represent the character of cities and the intentions of staff in cities better than other networks. As a consequence, cities with specific characteristics might group under one of the networks while not joining others (Busch, 2015; Giest and Howlett, 2013).

In recent years, an increasing number of articles and book chapters which investigate TMCNs and their role in climate governance have been published (Andonova et al., 2009; Betsill and Bulkeley, 2004; Bouteligier, 2013; e.g., Bulkeley et al., 2003; Fenton and Busch, 2016; Fünfgeld, 2015; Kern and Bulkeley, 2009; Toly, 2008). These have mostly been written by political scientists and geographers but there are also examples of interdisciplinary cooperation contributing to the development of theoretical frameworks, which describe the roles and functions of TMCNs. Below, we present three theoretical frameworks, which are aimed at understanding TMCNs' impact on climate governance.

2.1. Theoretical frameworks describing the impacts of TMCNs

One of the earliest efforts to conceptualise TMCN impacts (Bulkeley et al., 2003) identified four ways in which climate governance is affected: through a) knowledge dissemination, b) lobbying higher levels of the multilevel governance system, c) acting as implementing agencies for European policies and d) by creating and promoting policy initiatives throughout the multilevel governance system.

Andonova et al. (2009) suggested a model based on three main roles through which TMCNs can use “soft” governance instruments to influence European climate governance. The three roles are: a) information-sharing, b) capacity building and c) rule setting. These roles are not mutually exclusive and some networks combine different roles while others do not (Bulkeley and Newell, 2015).

A model which distinguishes four functions of TMCNs has been presented by Busch (2015). These four functions are networks a) as consultants, b) as advocates of municipalities, c) as platforms for municipalities and d) as commitment brokers of voluntary commitments. Table 2 serves as an overview for the different functions that are included in these frameworks. The order in which the functions are presented has been adopted to show similarities between the frameworks. All three frameworks share a function which refers to the horizontal flow of information (1). A function focussing on the implementation of policies is covered in row 2. The functions in the 3rd row all somewhat reflect the initiation of rules and the members' compliance with them. Finally, two out of three frameworks include the influence of TMCNs on higher levels of government such as national governments or the EU (4).

All the roles and functions defined in these frameworks can be a useful basis for a theoretical discussion of TMCN impacts. However, they only include impacts which occur through the interaction of networks and members or between members. Impacts of TMCNs occurring in internal governance processes in the member municipalities are not included. Thus, for assessing the full impacts of TMCNs on local climate governance, an inductive approach with an empirical investigation with substantial data from the level of local climate governance is needed.

This is also important in regards to how pioneers and laggards are defined in the context of TMCNs. If the impact of TMCNs is only seen in interactions between members or member and network then members without these interactions will automatically be framed as laggards. However, this view does not necessarily reflect the actual performance of the city in regards to climate policies or the impact TMCNs have on these “invisible” cities.

2.2. Assessments of local impacts

Despite the emergence of theoretical frameworks for understanding the functions of TMCNs, most studies remain on an abstract level and actual assessments of TMCNs impact on local climate governance are scarce. Several empirically-based studies come to the conclusion that the impact of TMCNs membership and functions on local emissions is not significant or impossible to measure (Bansard et al., 2016; Bulkeley and Newell, 2015; Davies, 2005; Fay, 2007). Other studies come to the opposite conclusion: Zeppel finds that one of the TMCNs, namely the CCP, has “played a significant role in urban climate programmes” in Australia (Zeppel, 2013, p. 226). Hakelberg (2014) concludes that TMCNs have “clearly promoted the spread of local climate strategies among European cities between 1992 and 2009” (p. 123).

Betsill and Bulkeley (2004) find that the CCP attracts active members not because it is serving as a knowledge platform but rather due to the access it offers to financial and political resources, as well as enhancing the legitimacy of climate protection. A study on the impacts of TMCNs in Ireland found that municipalities mostly perceive the TMCNs' role of disseminating information as being the most important (Davies, 2005), and Toly (2008) finds that the two most important functions of TMCNs are inter-municipal dialogue

Table 2
Overview of networks' roles and functions, adopted from Fenton & Busch (Fenton and Busch, 2016).

Function	Framework		
	Bulkeley et al. (2003)	Andonova et al. (2009)	Busch (2015)
1 (Horizontal flow of information)	Knowledge dissemination	Information sharing	Platform for members
2 (Implementation of policies)	Implementation of EU policies	Capacity building & implementation	Consultancy
3 (Rules & commitment)	Policy initiation	Rule setting	Commitment brokering
4 (Lobbying)	Lobbying		Advocacy and lobbying

and the pooling of global influence.

It remains unclear which member cities are actually influenced by membership in a TMCN. The local impact of TMCNs is of course likely to differ depending on the degree to which cities engage with TMCNs. But according to Kern and Bulkeley (2009 p.329), TMCNs are mostly networks of "pioneers for pioneers". This might be the case for networks which explicitly aim to gather leading cities like the C40 network. However, since Kern's and Bulkeley's study, the Covenant of Mayors (founded in 2008) was launched in Europe. This network has a constantly increasing number of members (currently 7692) and would seem to be a network of more than only "pioneers." The Covenant, just like Climate Alliance, is a network which attracts many small municipalities, seemingly being attractive for municipalities that could rather be characterised as being laggards. We argue, therefore, that the assessment of TMCNs as networks "for and by pioneers" must be revaluated in light of the development of the last years.

Three preliminary observations can be made on the basis of existing literature on TMCNs. The first is that TMCNs at least have the potential to have an impact on local climate policy due to their proliferation amongst European municipalities (Busch, 2015). Secondly, the impact of TMCNs has been identified to take on different shapes within the literature depending on the research approaches chosen, however this literature limits its focus to the interaction between networks and members and ignores the impacts of TMCN membership on internal local climate governance processes. Thirdly, recent and ongoing developments and changes within the network landscape have not yet been taken into consideration.

What all earlier studies have in common is that either a) they are several years old and thus potentially outdated; b) they are based on a few case studies, often of high performers and not a systematic investigation of a bigger population (e.g. Oppowa, 2015); or they are c) only focussing on one specific aspect of TMCN governance, e.g. the link between TMCN membership and the development of local climate strategies (e.g. Hakelberg, 2014); or d) they take the work of the networks' staff and not on the member municipalities as the starting point (Bansard et al., 2016; e.g. Van Egmond, 2011). An up-to-date analysis of TMCNs impact on local climate governance is missing. We address this gap through the following research strategy.

3. Research strategy

In the face of the presented diverse and even contradicting results, we decided to approach the research question in an explorative manner. Our approach consisted of: an online survey, interviews, field visits, analyses of relevant documents and homepages and observations at network conferences. We deliberately refrained from strictly applying any of the presented frameworks and instead applied an inductive approach during the data analysis to not miss any impacts which have not been conceptualised by the literature so far. In this phase previous frameworks served as sensitising concepts. Through an iterative process of data analysis and category development, our identified impacts emerged that were then compared to roles and functions of named frameworks. Despite the choice in favour of an inductive approach, we expected previous dominant ideas of TMCN influence to be confirmed by out data. This entailed all the benefits arising from the transnational character of the networks. For example, previous frameworks had often highlighted lobbying by the TMCNs and the benefits of learning and exchange of best practice amongst members (see Table 2). Consequently, we expected these three factors to prominently feature in our data.

3.1. Data collection

The potential respondents of the survey were sampled as follows: we first identified all German cities with more than 50,000 inhabitants that are a member of at least one of the TMCNs (see Table 1) active in Germany (n = 136). We then searched the homepages of these cities to identify personnel or departments concerned with climate policies and contacted them via email to identify the staff members responsible for liaison with TMCNs, if any. A link to the online survey was sent to the relevant staff members that we identified, once they had agreed to take part in the survey. These were in most cases the municipal climate managers, so staff which deals with the implementation of climate policies.

The survey included general questions about the city, more specific questions about climate policies (mitigation and adaptation) and the impact of TMCNs on local climate governance. We received 61 responses, corresponding to a 45% response rate but single questions had a lower response rate. The survey results are the core of the data we used for this article. These results were especially

Table 3
TMCN functions.

Category (process occurring through TMCN membership)	Occurrence
Enabling internal mobilisation	17
Formulating emission reduction goals	14
Institutionalising climate trajectories	14
Enabling direct exchange	14
Offering project support	14
Exchange of best practice	5
Helping with greenhouse gas accounting	5
Referring to a global context	3
Enabling access to funding	3
Advocacy and lobbying	1
Enabling green city branding	1

important in the formulation of the framework below (see Table 3).

Field visits were made to four cities (Bielefeld, Bonn, Hannover and Frankfurt am Main), which had been identified through the survey as well performing cities by their peers. The purpose of these field visits was it to gather more qualitative data to understand some of the mechanisms behind the quantitative findings from the survey. We chose well performing cities as we hoped to learn more about processes in places that had already implemented a wide range of local climate policies and had taken an active role in the TMCNs. Our reasoning was that the staff of these cities had already made ample experience in the work with TMCNs and might, thus, be able to provide insights to explain the patterns we identified in the quantitative data from the survey. Of course this approach bears the danger of focussing too much on theory confirming cases (Moses and Knutsen, 2007). However, as pointed out above, these interviews and field visits rather served as complementary data to our survey results. Additionally, we drew from three field visits to German cities (Heidelberg, Mannheim und Stuttgart) which had been conducted in an earlier research project. These cities had been identified as particularly active in their respective regional municipal associations. In all these cities we conducted interviews and made observations. For additional information we analysed material disseminated by cities and TMCNs, mostly consisting of webpages. Finally, we attended three TMCN conferences where we made observations and spoke to city delegates and staff of TMCNs. The conference visits were particularly valuable as they enabled us to observe and speak to potential future informants and to gain insights into what topics they prioritise when directly interacting with partners in the networks.

3.2. Data analysis

The analysis of our empirical data was guided by an inductive approach to the data. We started with analysing the results from the survey. The survey comprised of different kinds of questions, such as open questions or multiple choice questions. Accordingly, the analyses of these data relied on different methods: Open answers were collected and grouped according to either predefined categories or categories that emerged through selective coding in an inductive approach (Bryman, 2008). We then compared our categories with the frameworks presented above. After developing the new categorisation of impacts, we turned to our qualitative data to find explanations for the observed impacts and to answer further questions which were spurred by reviewing the results from the survey. For this we analysed our interviews with staff from German cities and TMCNs. Finally, we complemented the analysis with data from observations at TMCN conferences.

3.3. Limitations

One limitation of our analysis is that we cannot differentiate which TMCN brings about what kind of impact. The reason for this is that many German cities are members of more than one network simultaneously. Of the 136 cities considered as potential respondents, 37 were members of more than one TMCN. At the same time the survey was conducted in a way that ensured anonymity of our respondents. Our data is dominated by members of Climate Alliance: only 5 of the 136 cities are not members of Climate Alliance, reflecting the wide proliferation of this network in Germany. Climate Alliance was founded in Frankfurt in 1990 and has since then been dominated by municipalities from German-speaking countries. 36 cities of the 136 cities are member of the Covenant of Mayors.

The size of the population (136, response rate of 45%) does not allow for any sophisticated statistical analysis of our data. Therefore, we only present simple correlations as indicators for trends.

4. Results and discussion

4.1. Functions of TMCNs

'Which aspects of local climate governance are influenced by membership in TMCNs?'

32 of the survey respondents reported that the membership in TMCNs has had an impact on the content of local climate work. 5 did not answer the question. 9 reported that they do not know about such an impact, whereas 15 reported that TMCNs have not influenced the content of the local climate work. An open question "How does TMCN membership influence local climate governance?" was posed in the survey to identify the fields of local climate governance that our respondents deemed most influenced by TMCN membership. The respondents were here instructed to name the four most important factors starting with the most important. 31 of our 61 respondents answered the question, but some supplied less than four factors. All in all, 101 factors were named by our respondents. We coded these responses according to selective coding to develop the categories for the different influences of TMCN membership on local climate governance.

Through our analysis we group the replies into five main categories:

1. Our respondents reported that TMCN membership influences local climate governance through *enabling internal mobilisation*. Internal mobilisation encompasses awareness-raising in local politics and the local population and thereby constitutes a means of "soft" governance within the respective municipality. For example, respondents reported that through joining a TMCN the topic climate change mitigation had made it to the local political agenda. Participation in network activities can also be used as proof for a successful climate work of the environmental departments. In addition, the TMCN membership was used as a political argument to justify climate policies.
2. The second most important way of how TMCNs membership unfolds is through helping staff in municipalities in *formulating emission reduction goals*. Many networks require their members to commit to *formulating emission reduction goals*. This helps

proponents of stronger climate policies in municipalities by assigning a certain authority to emission reduction goals. For example, upon joining the Covenant of Mayors, municipalities pledge to deliver Sustainable Energy Action Plans (SEAP) that have to at least meet the EU goal of 20% CO_2 emission reduction by 2020. And members of Climate Alliance committed to cutting CO_2 emission by 10% every 5 years and to halve per head emissions by 2030 (1990 base year). Besides such commitments TMCNs support their members in formulating emission goals by enabling benchmarking.

3. The third category, which we named *institutionalising climate trajectories*, describes how actors in cities can use TMCN membership to create a kind of lock-in that sets the frame for local climate governance. It encompasses answers that reflect the "institutionalised" counterpart of the *internal mobilisation* category. It refers to the integration of climate change policies into local institutions. These can be binding documents of municipal decision making bodies, but also the institutionalisation of climate change policies into local administrative structures, e.g. in the form of new positions for climate managers that are being justified through TMCN membership. *Institutionalising climate trajectories* reflects the efforts of individuals or groups within the municipality to perpetuate climate-friendly politics and to limit the scope for local decisions that are harmful to the climate.
4. The fourth category is *enabling direct exchange*. Direct exchange influences climate policies in a threefold way: firstly, it refers to the direct exchange of ideas between cities. Secondly, it refers to the networking of the municipality staff to initiate regional or international cooperation with other municipalities. Thirdly, it refers to an important aspect that has so far not been taken up by the scientific literature. For many staff members it is important to have a regular exchange with peer from other municipalities who are in a similar position and who fight similar battles in their municipality. The exchange at network events invokes a sense of working together towards a common goal. This motivational boost becomes particularly visible at network conferences where this common cause and a sense of companionship are stressed by many speakers. While this category was as frequent as the *formulating emission reduction goals* or *institutionalising climate trajectories* categories it has seldom been mentioned the most important of the four influencing factors by our respondents.
5. *Offering project support* encompasses all the help the networks' infrastructure and administration provides for the implementation of concrete activities. This comes e.g. in the form of ready-to-use project ideas or competitions within the network such as Climate Alliance's *Stadtradeln*, a bike competition amongst German members. Networks not only provide ideas and material for these projects, their staff is also available for helping with the implementation.

We also found several other but less frequently occurring categories in the answers:

6. *Exchange of best practice* examples which were promoted by the networks' own information systems (e.g. homepages, conference presentations, newsletters);
7. *Helping with greenhouse gas accounting*: TMCNs help municipalities to generate knowledge of local emissions by providing methodologies such as GHG accounting software. The resulting emission data can then be used to identify intervention points for local climate policies. *Offering project support* and *greenhouse gas accounting* can both be framed as consultancy services which are provided by the networks. However, we decided against grouping these two services together because they constitute very different services from the point of view of municipalities. While *offering project support* helps with the implementation of concrete measures to cut emissions or adapt to climate change, *greenhouse gas accounting* builds a knowledge base for a municipality to quantify and measure GHGs.
8. TMCNs influence local climate policies through *referring to a global context* by providing information on international climate policy. In this context, one respondent referred to Climate Alliance's partnership with the indigenous people of the Amazonian rainforest. But networks also provide information on global policy processes such as documentation of COP negotiations on social media.
9. *Enabling access to funding*: TMCNs do not provide funding themselves, so this category refers to the networks providing access to funding by other entities. For example, the Climate Alliance hosts workshops at their international conferences where staff from member cities learns how to best file applications for EU funding schemes.
10. One respondent named the work the networks are doing in the context of *advocacy and lobbying* as an important factor influencing local climate policies. This is related to the work networks do to influence the climate policies on higher levels such as the national or the international level to create favourable conditions for local climate work. This point is reflected in several of the frameworks described above.
11. TMCNs offer opportunities to advertise the city through *enabling green city branding* activities. TMCNs offer their members a number of channels such as newsletters, press releases, space on homepages, conferences and printed material to highlight cities' efforts. This final category does not refer to a direct influence of local climate governance but a side aspect of it. We included it in this list as many TMCN name branding or branding related activities as a benefit for members. However, only one respondent referred to green city branding in the survey.

A further 11 answers could not be placed in any category as they named fields of climate policy (e.g. "climate change adaptation" or "green public procurement") and not processes or mechanisms in which the network membership influenced local policies and governance.

4.2. Unfolding of influence

'How does TMCNs membership influence the municipalities?'

TMCNs have developed a number of channels for communicating with their members as well as facilitating communication between members. These channels include newsletters, leaflets and network conferences. In addition, TMCNs offer consultancy services in the form of individual "TMCN to member support" or through tools and activities. All these channels influence the members' climate work and enable some of the categorized impacts above. However, our survey results actually indicate that the main impacts of TMCNs on local climate governance occur independently of these channels.

The three most frequent categories of impact were *internal mobilisation*, *formulating emission reduction goals* and *institutionalising climate trajectories* which all refer to internal governance processes for which a direct interaction between staff in cities and staff of networks is not necessary. While interaction between TMCNs and cities or amongst cities can support these internal processes, they are first and foremost the result of local political processes. Although the continuous input from the networks does not seem to be necessary for these internal governance processes, climate managers still link them to their cities' TMCN membership. This also means that acquiring TMCN membership can have an impact on climate governance even in cities which can be characterised as "dormant" or laggards within the network because they do not take part in conferences or other network activities. The fourth most important category, *direct exchange*, reflects communication and cooperation between the members of TMCNs. Only the fifth most important category, *project support*, refers to the direct flow of information from TMCNs to members. These last two categories reflect the TMCN functions of former frameworks (see Table 2) which very much focussed on the interaction between different municipalities or municipalities and network infrastructure.

In the survey we directly asked the respondents if and how local climate governance was influenced by the *direct exchange* with other network members. Of 55 respondents who answered the question, 35 stated that the local climate work had been influenced by the *direct exchange* with other members. 13 saw no influence and 7 were uncertain. We asked the respondents to describe this influence and categorised the replies into three mechanisms to see if any of them could be provided by direct exchange between TMCNs and members. 16 respondents stated that *direct exchange* with other members brings "new ideas" to the city administration, while 15 respondents stated that it was possible to be able to draw on other members' expertise. An additional 8 named "synergies" in the form of joint projects or shared costs for the analyses of the potential for the generation of renewable energies. *Direct exchange* has also shown to be important by observations made on network conferences. In several presentations, speeches and discussions during conferences climate managers stressed that these network meetings had a very important motivational effect. Many climate managers feel that they are faced with a constant struggle with other departments in their own municipality. Attending the conferences works as a motivational boost, because ideals and values are shared with other delegates and they are reinforced through invoking a positive spirit during the meetings. Consequently, the network conferences were named as the most important channel for our respondents to learn about other cities' climate work (35 out of 41 stated that they had learned about other cities' efforts).

Above results lead us to the understanding that TMCNs play an important role in internal decision making processes within member municipalities. Betsill and Bulkeley describe this role for the CCP as a "legitimacy tool" for local governments. They argue that the membership in CCP was used to confer "*particular norms about climate protection*" (Betsill and Bulkeley, 2004 p. 471). At the same time, many functions identified by former frameworks (see Section 2.1) like "access to funding", "green city branding" or "advocacy" which focus more on the interplay of municipalities and external actors, are less important.

Our data reveals that for several of the main impacts to unfold, the act of joining and the status of remaining a member are more important than a continuous involvement in network activities. The initial commitment to cut emissions that is made by municipalities upon joining TMCNs often serves as the basis for an ongoing commitment to emission reduction goals. One of our informants, a former staff member of Climate Alliance, explained: "*the proponents of more ambitious climate policies in the municipality often argue: 'we signed this, so now we have to live up to it'*". This quote reveals an additional aspect of cities' work with municipalities: local actors within the municipality are required for the membership to have an impact. The act of joining is not sufficient.

A surprising result was that both *advocacy and lobbying* as well as conscious *green city branding* did not play a major role in the cities' work with TMCNs (both were only named once in our survey). The impact of *advocacy and lobbying* by TMCNs on higher levels of governance such as the nation states or the EU has been emphasised as one of the most important functions of these networks by many authors (e.g. Oppowa, 2015). Consequently, it has been one of the main functions in previous conceptualisations of TMCNs (cf. Bulkeley et al., 2003; Busch, 2015). Oppowa (2015) finds in connection with a study on TMCN impacts that lobbying constitutes the most important function of TMCNs, however, his assessment is mainly based on data collected directly from network staff and a few major German cities. Networks themselves stress the aspect of *advocacy and lobbying* when describing their work. One explanation for the discrepancy between our results and the perception of other researchers and the network staff is the level of analysis. A more systemic approach to the role of TMCNs within European climate governance will of course emphasise the question of lobbying more than our approach which explicitly focusses on local impacts as perceived by municipal staff. It is still remarkable that the impact of *advocacy and lobbying* by TMCNs seems rather irrelevant or not visible to actors on the local level.

The second unexpected result came in the marginal role which was assigned to *green city branding* on the municipal level. Networks offer multiple channels and opportunities (newsletters, homepages, conferences) for cities to market their climate change policies and sustainability achievements. This finding, however, is in line with a more focused analysis of this issue by Busch and Anderberg (2015) who find that German cities barely use their membership in TMCNs for green city branding.

8 of the 136 cities we contacted in the context of our survey reported that they either a) are overworked and have no time for surveys or b) do not actively work with TMCNs. This shows that TMCN membership does not only affect the local climate work positively. The fact that the work with TMCNs binds resources of municipalities is an aspect that often is overlooked in the literature. Municipalities can only utilise the opportunities for exchange and cooperation TMCNs offer if time and funds are directed at the TMCN work. Some networks such as the Covenant of Mayors demand regular emission reports of their members. These reports can become a cumbersome task especially if, according to one of our interviewees, the municipality has to do similar reporting for several

networks or initiatives. An example is the European Energy Award (eea), which uses a different methodology to measure similar things to the SEAP of the Covenant of Mayors. This double reporting binds resources which could otherwise be used to implement actual improvements and projects in the city and it can lead to "mainstreaming overload" (Wamsler, 2015 p.13). In face of this extra workload, it is not surprising that a number of cities take a rather passive role in the work with the TMCNs they are members of.

4.3. Pioneers and laggards

In the context of TMCNs the literature often divides member cities into two groups: laggards and pioneers. Laggards are underperforming in comparison to a certain group, say members of a TMCN, whereas pioneers are spearheading the field of climate governance. In the past, TCMNs have mostly been seen as networks which are beneficial for pioneers (Kern and Bulkeley, 2009). And due to their soft government mechanisms (Andonova et al., 2009), they only have limited influence over laggards (Hakelberg, 2014). While these laggards fail to live up to their commitments they can, according to Hakelberg, still use their TMCN membership "*as a publicly visible signal for climate-related activity*" (Hakelberg, 2011 p.123).

However, all of the three most frequent impact categories (*internal mobilisation*, *formulating emission reduction goals* and *institutionalising climate trajectories*) rather concern laggard than pioneer cities. Well-established climate pioneers can rely on their many years of successful climate policies and are not dependent on employing their membership in TMCNs to mobilise citizens or local companies. The same applies to emission reduction goals. Pioneers are spearheading the trend and have probably already formulated and adopted all reduction goals TMCNs suggest. One respondent from a city which had been identified as well-performing through the survey reported that the different emission commitments along with the differing reporting tools of TMCNs actually produce additional work. Finally, a long standing history in successful climate work and a *institutionalising climate trajectories* tend to go hand in hand. Based on these considerations, we argue that the assessment that TMCNs are mostly beneficial for pioneers is not confirmed and should thus be revaluated.

In contrast to the first three categories, *direct exchange* poses an attractive opportunity for both pioneers and laggards. While laggards can learn from municipality staff with more experience in implementing climate policies, pioneers can reach beyond the municipal borders and implement more ambitious projects through cooperation. However, as pointed out above, the aspect of *green city branding* through TMCNs does not play an important role for German cities (Busch and Anderberg, 2015). Like *direct exchange*, the impact of *project support* is something both laggards and pioneers can benefit from. Our respondents stressed that it is very convenient for staff in municipalities if ready-made projects can be implemented easily (Table 4).

4.4. Where is the agency?

Our findings do not confirm the assessment of former research which described TMCNs as networks by pioneers for pioneers (Hakelberg, 2014; Kern and Bulkeley, 2009). One explanation for this discrepancy is the development of the TMCNs and their members in recent years. Hakelberg's analysis e.g. is based on data from 2009 and earlier and thus is no longer fully valid. Since then the Covenant of Mayors (founded in 2008) has attracted many small municipalities. At the same time new networks have emerged, like the UNISDR Resilient City (founded in 2010) or the Mayors Adapt (founded in 2014). These two networks also reflect the trend that climate change adaptation has increasingly entered the agenda of local climate governance (cf. Wamsler, 2015). While smaller municipalities and cities might be hesitant to contribute to mitigation efforts due to their limited impact on this issue, they have to provide adaptation measure just like bigger cities as they will be hit by climate change induced disasters just like big cities.

While the scene of TMCNs has certainly changed in recent years, the presented frameworks from earlier studies (see Section 2.1) suggest another explanation. The role of TMCNs in internal political processes in cities has not received much attention in former research. Instead the scale of the analysis was chosen so that the networks as separate entities with their roles and functions were investigated and not the processes in member cities. This also raises an important question about where, in the complex interactions related to TMCNs, agency is located. Former research on TMCNs dominantly treated cities as internally homogenous actors. The division into laggards and pioneers is an example for this approach by which a city is treated like a single actor with a coherent agenda. Operationalisation of cities is beneficial for comparability, especially when dealing with a group of cities. However, this

Table 4
Impact of TMCN functions.

Category (process occurring through TMCN membership)	Function more relevant for laggards or pioneers
Enabling internal mobilisation	Laggards
Formulating emission reduction goals	Laggards
Institutionalising climate trajectories	Laggards
Enabling direct exchange	Laggards & pioneers
Offering project support	Laggards & pioneers
Exchange of best practice	Laggards & pioneers
Helping with greenhouse gas accounting	Laggards
Referring to a global context	Laggards & pioneers
Enabling access to funding	Laggards & pioneers
Advocacy and lobbying	Pioneers
Enabling green city branding	Pioneers

approach reduces the social and political complexity of internal processes within cities, which in turn leads to a "blind-eye" for the mechanisms and processes which dominated our data. Our approach which focussed on the cities' climate managers as main actors revealed that networks can be an important tool for internal processes driven by engaged agents in the member cities.

A recurrent theme during our interviews was the importance our informants assigned to single actors within the city. In most cases these were staff members in the municipal environmental or planning departments or local politicians who had pushed the issue of climate change onto the local agenda and who had over many years directed great efforts into local climate governance. These actors, their actions and the internal use of TMCNs in local politics were not the focus of previous research, which instead took the TMCN and not the member cities as point of departure.

5. Conclusions

TMCNs are wide-spread in Germany, especially amongst bigger cities. However, they differ greatly in number of members. At the same time staff in German cities which are members of one or more TMCNs dominantly report that the networks have influenced the cities' governance, policies and measures which address climate change. Not surprisingly, this impact was stronger in the field of climate change mitigation than adaptation. Mitigation has been on the agenda of TMCNs for up to 25 years while adaptation only entered the scene in recent years. Correspondingly, our survey showed that considerably more cities have a strategy for climate change mitigation than for climate change adaptation.

Our analysis showed that staff in cities mostly uses TMCNs for internal political purposes for *internal mobilisation*, *formulating emission reduction goals* and *institutionalising climate trajectories*. This means that the act of joining and the fact of being a member are perceived as more important than services which are actively provided by the networks' own staff and infrastructure. It also means that actors in cities that can be characterised as "dormant" members of the network can still use the membership to positively influence local climate governance. Other network functions such as offering opportunities for city branding did not come up to the same degree. This is to some degree surprising as the networks themselves stress these functions when describing their own roles and functions.

Our data further shows that staff in municipalities see the main impact of TMCN membership in functions that would rather be associated with the needs of laggards than pioneering cities (*internal mobilisation*, *formulating emission reduction goals* and *institutionalising climate trajectories*). In face of these findings, former assessments of TMCNs as networks for and by pioneers do not seem to hold true any longer. It can be questioned if this is due to an evolvement of TMCNs or a different focus we chose for this research. Irrespective of the reason, our results have confirmed us in the conviction that any assessment of TMCN impact on local climate governance needs to adopt the local level as its starting point.

Furthermore, staff in German cities does not evaluate the function of *advocacy* by TMCNs as an important impact on the local climate work. In contrast, many TMCNs see *advocacy* as a very important aspect of their work (Oppowa, 2015). For the staff of TMCNs, it could be important to investigate the discrepancy between the perception of *advocacy* by members and by the TMCN staff themselves. However, this finding is consistent with our finding that actors in cities use the membership in TMCNs mostly for internal political reasons, while interactions with other actors on different administrative levels are not of upmost importance.

During the course of conducting the research for this article a number of new questions and issues arose which are crucial for exploration in future research. As indicated, our methodology was limited in that we were unable to assign a specific impact to a certain TMCN. Future research could thus look into the question of which impacts are particularly strong in municipalities that are a member of different TMCNs, so that local impacts can be assigned to certain TMCNs. While our study mostly sheds light on the impact of TMCNs on climate policies in cities, future research could focus on the impact of TMCNs on rural and in particular small municipalities. It would also be interesting to investigate how municipalities, which - due to the size of their administration - have limited resources, can develop strategies to tap into the potential TMCNs offer. This focus is particularly interesting in the context of Southern Europe where many small municipalities have joined the Covenant of Mayors.

We conclude that TMCN membership plays an important role in internal decision making processes in municipalities. We therefore suggest that future research should, most of all, focus on exactly these internal processes. Research in the past has focussed too much on the wrong levels of governance (the networks as such or European climate governance) when assessing the impacts of TMCNs. Thus, the most important aspect of TMCNs impact, namely the internal use of TMCN membership, was systematically neglected. An approach which focusses on these internal processes could for example draw from theories on policy entrepreneurs.

Apart from the scientific contribution our research can also inform staff from networks and city administration. Network staff can use our findings to underline the positive impacts TMCN membership brings about. In particular TMCNs should reconsider how advocacy and lobbying efforts are presented to network members. Our findings suggest that despite the fact that TMCNs communicate their activities in this field actively, climate managers in German cities seem unable to link these efforts to actual impacts on the ground. It might help actors in cities to clearly understand how lobbying translates into tangible benefits in their daily work. Finally, staff in networks might find it encouraging knowing that TMCN membership has the potential to unfold positive effects on local climate governance even in cities which seem to be "dormant" due to their low involvement in continuous network activities.

Finally, it might be an important finding for actors in cities that TMCNs can positively impact the local climate governance in all kinds of cities, irrespective of where they are in their development. TMCN membership offers benefits for laggards and pioneers alike.

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Statement of competing interests

The authors declare no competing interests.

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